and setting down in a concise and clear form the results of many years of very successful study and teaching of the subject presented. It may well become a new starting point for editions that should take on the size and type of illustration that the dignity of a college botany deserves. Here is a hearty welcome to the new text-book in phytophylogeny—The Besseys' Botany Book of Branches.

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RUTGERS COLLEGE,
October 28, 1914

Botanical Features of the Algerian Sahara. By WILLIAM AUSTIN CANNON. (Publication No. 178, Carnegie Institution of Washington. 1913. 81 pages, 36 plates.)

The journey of which this paper is an account was made in order "to examine the more obvious features of the physiological conditions prevalent in the region in question and, in connection with these observations, to make some detailed studies of the root-habits of the most striking species of the native flora."

After introductory chapters on the geography and climate of Algeria, the writer proceeds with an itinerary of his trip through the desert. This portion of the paper contains a great deal of topographical detail, together with much that is of directly botanical interest, although presented in a somewhat desultory way. The important botanical data are treated more systematically in the "General Summary and Conclusions" (pp. 66–81).

The author's intimate acquaintance with the vegetation of the southern Arizona deserts makes his comparison of conditions there and in the Algerian Sahara of special interest and value. Some of the striking points of difference as summarized in the concluding paragraphs are: (1) the greater sparseness of the Saharan vegetation, as compared with that of Arizona, there being "probably no large area in southern Arizona, where the soil conditions are favorable for plants, where the water conditions are too meager to support a perennial flora of some sort. The greater aridity of the northern portion of the Sahara is evident, therefore, from the great contrast in its flora." Cannon therefore suggests the term "semi-desert" for the Arizona region in contrast with a true "desert" like the Algerian Sahara. (2) The smaller size of the individual plants, at least of the perennial species, in the Sahara. (3) The smaller development of spines. "What may be the proportion of armed to unarmed plants in the northern Sahara I do not know, but to a person familiar with the plants of southern Arizona, where spinose forms are very numerous, the Algerian plants do not appear especially well protected."

Attention is also called to the fact that while in the Arizona desert there are numerous species, among the Cactaceæ and other families which have a "water balance," *i. e.*, which during and immediately after rains store water in their tissues, to be drawn upon in periods of drought; few examples of this adaptation were met with in the Algerian Sahara. Cannon correlates this scarcity of "water balance" plants with the fact that in Algeria there is but one rainy season. He notes that in the Tucson region, where such plants are numerous, there are two rainy seasons during the year, while in the desert region farther west, where but one well marked rainy season occurs, succulent plants are few or wanting.

The author's studies of the root habits of desert plants in Arizona led him to devote especial attention to this feature of the Saharan vegetation. The results of his investigations are summed up as follows: "A study of the relation of the root-type of the Algerian plants to the plant's distribution leads to the same general conclusion already obtained by similar but more extended study in the Arizona desert, namely, that the connection is often a very close one and often of definitive importance. Where the root-type is an obligate type the distribution of the species is much restricted, but where it undergoes modification with changed environment the distribution of the species is much less confined. It is of interest to note especially that as a rule it is the latter kind of root system that is developed by such plants as occur where the soil conditions are most arid, that

is, on the hamada or its equivalent, and not the former, from which it follows that the generalized type of root-system is really the xerophytic type *par excellence,* and not the type with the most deeply penetrating tap-root, as might be supposed." An interesting case of accommodation of root habit to character of the soil is mentioned: "The roots of *Haloxylon* on the hamada at Ghardaia develop both laterals and a main root, but in deeper soil, as at Biskra and Ghardaia also, the laterals are nearly suppressed and the tap-root is the striking feature."

The Algerian desert vegetation was found to have been greatly modified by grazing. In the vicinity of large towns, such as Ghardaia, the cemeteries, which are surrounded by walls, were practically the only places where the native vegetation could be found in a relatively undisturbed condition. The author comments on the fact that certain species, *Haloxylon articulatum,* for example, which are persistently grazed and of which the dissemination would appear to be very difficult, nevertheless remain extremely abundant. It is pointed out that this factor must have been operative even before domesticated animals were introduced into the region, since the native fauna includes several grazing animals. A striking indication of the modifying influence which the persistent action of this factor during many centuries must have had upon the vegetation is afforded by the present distribution of the betoum (*Pistacia atlantica*): "The betoum, which is the largest arboreal species in the Sahara, is confined to the region of the Dayas; that is, to the country immediately south of Laghouat. The tree is unarmed and is eagerly sought after by all herbivorous animals for its foliage and tender twigs. Owing to the presence of such animals, wild and domesticated, the young tree would have no chance to survive were it not that, growing in association with it, is the jujube (*Zizyphus lotus*), which is armed and is not eaten by any animals. The jujube affords safe protection for the seedling betoum, and in its capacity as nurse prevents predatory attacks by animals during the critical period. The survival (and probably the distribution as well) of the betoum is mainly conditioned on the presence of its protector."

At Ghardaia it was observed that many of the perennial species were resuming growth and beginning to flower in November, although no rain had fallen for twelve months. The following explanation is suggested: "Judging from analogy, therefore, it would appear that the stimulus to development on the part of the M'Zabite plants may be from the relatively better water relations made possible by a lower temperature without rain. In November at Ghardaia the evaporation rate is much below that of summer, that during the night being very small. Further, it was told me by good authority that the same species seen growing in autumn renew growth whenever rain chances to come, whatever might be the season. But it should be remembered that rain most commonly occurs in this region in winter, so that the plants may have a rhythm to which they usually conform, but from which they may depart, and that both stimuli (better water relations and lower temperature) are the annually recurring factors by which it may have been induced. Reference, of course, is made to perennials only, as no annuals were seen until the rains of spring made conditions favorable for their appearance."

Exposure appeared to be an important factor in plant distribution only near the northern edge of the desert.

"In parts of the Sahara visited where the most rain is reported, especially Laghouat and Biskra, plants were observed to exhibit exposure preference. Here the south or southerly facing slopes may have a floral composition different from the opposite exposure. In each instance the soil conditions, and apparently the moisture conditions also, were alike." Farther south, at Ghardaia, "provided there is sufficient depth of soil, apparently any species may be found on any exposure."

The numerous excellent illustrations showing the general appearance of various types of vegetation and the habit and root development of characteristic species are an attractive feature of this publication.

The scientific value of the facts and conclusions makes it regrettable that more attention was not paid to the manner of their presentation. The arrangement of the subject matter is not very satisfactory and there is a noticeable tendency to diffuseness and repetition. There is evidence on every page of hasty writing or of inadequate editing and proof-reading. The want of precision in statement frequently leads to ambiguity.

These faults of style detract from the pleasure which the reader would otherwise derive from the interesting subject matter. In this respect the present paper is not peculiar, however, scientific writings being all too frequently deficient in literary form. The effectiveness of much good work in science is diminished through lack of care in its preparation for publication.

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British Antarctic "Terra Nova" Expedition, 1910. Zoology, Vol. 1, No. 1. Fishes by C. TATE REGAN, M.A. 4°. Pp. 54. Pl. I.–XIII. British Museum, Nat. Hist., June 27, 1914.

This is the first of the reports on the Natural History of the expedition conducted by the late Capt. Scott, R.N. The Antarctic fishes obtained comprise twenty-five species, of which four are new generic types and twelve species are new to science. Nearly all are from rather deep water. Most of the species belong to the Nototheniiformes. A new genus of the Bathydraconidæ resembles the northern Cottoid *Icelus* in its armature of bony spinose plates and the discovery of an Antarctic species of *Paraliparis* is interesting.

For the first time according to the author, the knowledge of the coast fishes of the Antarctic continent is sufficiently complete to make it worth while to attempt to delimit an antarctic zone and to divide it into districts. South of the tropical zone the distribution of coast fishes is thus classified by him. (1) South Temperate zone with seven districts: Chile, Argentina, Tristran d'Acunha, Cape of Good Hope, St. Paul Island, Australia and New Zealand. (2) Subantarctic zone, with the districts of Magellan and Antipodes, the latter including the island near and south of New Zealand. (3) Antarctic zone with the Glacial and Kerguelen districts. The Antarctic zone is characterized by the complete absence of South Temperate types and Bovichthydæ, and the great development of the other Nototheniiformes. The facts point to the conclusion that Antarctica may have been long isolated and that its coasts may have been washed by a cold sea probably throughout the entire Tertiary period. The author rejects the idea that it may have been connected with South America during recent geological time, as supposed by Dollo in the "Belgica" report. There has also been issued Vol. 11, Pt. 1, containing a twelve-page list of stations where collections were made, with full data, and four maps upon which the positions are indicated.

WM. H. DALL

SPECIAL ARTICLES

THE FAILURE OF EQUALIZING OPPORTUNITY TO REDUCE INDIVIDUAL DIFFERENCES

SEVENTY-TWO students in an undergraduate course in psychology did the experiment described in the note below.[1] Although this was primarily a test for fatigue there was, as is usually the case, an improvement with the

[1] Do experiment 36 at home and record the results. Follow the directions absolutely.

EXPERIMENT 36

Arrange to be undisturbed through a morning or an afternoon or evening. Provide yourself with a watch that records seconds. Multiply mentally, using the examples printed on this page, writing absolutely nothing until you have the entire answer to an example. Then write it and proceed at once to the next. Record the time at which you begin, and record the time at which you have finished each row. Do not stop at all except to record these times until you have finished all the examples or worked at least two hours. Do absolutely the best work you can throughout.

	653	537	927	847	286	728
A.	926	453	384	265	757	487

Nine similar rows were provided.